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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/406,663	09/27/1999	DANIEL R. KNEBEL	13031(YO999-	1830

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EXAMINER

FERRIS III, FRED O

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 02/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/406,663

Applicant(s)

KNEBEL ET AL.

Examiner

Fred Ferris

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 39-41 and 43 is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☒ Claim(s) 42 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 September 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. *A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 26 November 2003 (paper # 8) has been entered. Claims 1-43 are currently pending in this application. Claims 39-41, and 43 have now been allowed. Claims 1-38 remain rejected. Claim 42 is objected to.*

Response to Arguments

2. *Applicant's arguments filed on 26 November 2003 (paper # 8) have been fully considered.*

Regarding applicant's response to 102(a) (Knebel) rejection: *The examiner withdraws the 102(a) rejection in view of applicant's declaration filed 26 November 2003 (paper #7).*

Regarding applicant's response to 102(b) (Dangelo) rejections: *The examiner asserts that the amendment to claim 1 relating to "a visual form that illustrates (the) causal relationship that one or more device activities has one or more other device activities" does not overcome the 102(b) Dangelo prior art rejections. The examiner notes that the "causal relationship" as shown in Figure 1 of claimed invention merely depicts waveforms with noted transitions between the rising and falling edges (relative*

to time and amplitude) as would be shown on any multi-channel digital oscilloscope commonly used in the art for timing analysis. This is also inherently implied in Figure 19 of Dangelo. Namely, that the "cause" of an event or state change for each device is "related" to state (activity) of the other devices in the circuit. The broad limitations of claim 1 do not distinguish the claimed invention over the prior art. Accordingly, the examiner maintains the 102(b) rejection of claims 1, 2, 3, 6, 7, 14, 15, 28, 32, and 33 using Dangelo as prior art as cited in the final office action. However, the examiner now withdraws the 102(b) rejection of claims 39-43 using Dangelo as prior art in view of applicants amendment to the claims. (please see Allowable Subject Matter below)

Regarding applicant's response to 102(b) (Rowson) rejections: The examiner maintains the 102(b) rejection of claims 1, 8, 9 using the same reasoning as cited above. However, the examiner now withdraws the 102(b) of claim 39 using Rowson as prior art.

The examiner has also applied new 103(a) art rejections to claims 1-38.

Drawings

3. *This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.*

Claim Objections

4. *Claim 42 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is*

required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 42 includes the same limitations as claim 39 for which it depends and does not further limit the independent claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 3, 6, 7, 14, 15, 28, 32, and 33 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by U.S. Patent 5,555,201 issued to Dangelo et al.

Independent claim 1 and 39 are drawn to:

Method and means for visualizing circuit operation by:

Obtaining device activity by measure/simulated activity

Expressing device activity in representation

Representing activity in visual form

Regarding independent claim 1: Dangelo discloses **visualizing the operation of a circuit** by obtaining **device activity** from **measured or simulated** activity and **visually displaying results** representing the device activity. (Abstract, Summary, CL22-L55, CL24-L58, CL28-L28, CL32-L62, Figs. 8, 9, 13-15, 18-20, 25)

Regarding claims 2, 3, 6, 7, 14, 15, 28, 32, 33, 40 and 41: Dangelo also discloses sequence relationships (Figs. 13-15), IC CAD viewer (Figs. 18, 19), sequence

graph (Figs. 13-15), simulated activity (events/states) (Figs. 8, 9, 13-15, 18-20, 25), switching events (Figs. 18, 19), switching behavior from netlist (Figs. 2, 8, 9), waveform transitions (Figs 18, 19).

6. ***Claims 1, 8, 9 are further rejected under 35 U.S.C. 102(b) as being clearly anticipated by U.S. Patent 5,251,159 issued to Rowson.***

Regarding independent claims 1 and 39: Rowson discloses ***visualizing the operation of a circuit by obtaining device activity from measured or simulated activity and visually displaying results representing the device activity.*** (Abstract, Summary, CL2-L11-18, CL3-L13-23, 30-42, 43, 45-61, 65, CL5-L33-45, Figs. 1, 4, 5)

Regarding dependent claims 8 and 9: Rowson discloses a visual form of ***animation of the device activity.*** (CL30-L66, CL5-L34, Figs. 4, 5)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,555,201 issued to Dangelo et al in view of U.S. Patent 6,327,394 issued to Kash et al.

Per claim 1: Dangelo discloses **visualizing the operation of a circuit** by obtaining **device activity** from **measured or simulated** activity and **visually displaying results** representing the device activity. (Abstract, Summary, CL22-L55, CL24-L58, CL28-L28, CL32-L62, Figs. 8, 9, 13-15, 18-20, 25) Per claims 2-38: Dangelo also discloses sequence relationships (Figs. 13-15), IC CAD viewer (Figs. 18, 19), sequence graph (Figs. 13-15), simulated activity (events/states) (Figs. 8, 9, 13-15, 18-20, 25), switching events (Figs. 18, 19), switching behavior from netlist (Figs. 2, 8, 9), waveform transitions (Figs 18, 19).

Dangelo does not explicitly teach modeling device emissions of designated areas (regions) as point sources or optical emission measurement data comparison.

Kash discloses techniques for processing optical emission data ("waveforms") for the derivation of quantitative data on circuit delays from time resolved images of switching induced emission in CMOS circuits. Kash further discloses the analysis of delays associated with gate to gate propagation, designated point source areas, and the (x, y) pixels in generating waveforms in emission measurement and comparison. (entire teaching, especially: Abstract, Summary, CL9-L19-61, CL10-L45-CL12-L47, CL13-L45, CL14-L25, Figs. 1-7)

*It would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the teachings of Dangelo relating to **visualizing the operation of a circuit** by obtaining **device activity** from **measured or simulated activity** and **visually displaying results** representing the device activity, with the teachings of Kash relating to techniques for processing optical emission data ("waveforms"), to realize the claimed invention. It would further have been obvious to include features such as slow motion animation, animated schematics, highlighted color features, and audio tones since these features were available (inherent) with nearly of the popular CAD circuit design programs (AutoCAD, Spice, etc.) at the time of the invention. An obvious motivation exists since this area of technology is highly competitive with long felt need already established in the market place and large amounts of money being spent in product development and improvement. (See, Knebal conclusion, for example) Accordingly, a skilled artisan would have made an effort to become aware of what capabilities had already been developed in the market place and, hence, would have been motivated to modify the teachings of Dangelo with the teachings of Kash in order to reduce development time and cost.*

Allowable Subject Matter

8. *The following is an examiner's statement of reasons for allowance:*

Independent claim 39 uses "mean for" language is are given deference in view of In re Donaldson and interpreted in view of 35 U.S.C. § 112 paragraph 6. The "means for" language and the limitations related thereto of claim 39 is interpreted within the

scope of enablement as provided within the relative embodiment provided within applicant's specification. Specifically, applicant's specification page 6, line 15 to page 9 line 11, page 13, line 30 to page 14, line 25, page 15, line 19 to page 20, line 5, and Figs. 3-9 disclose the claimed inventions "means for" expressing and visualizing the simulated circuit optical emission activity.

Applicants are encouraged to amend independent claim 1 to include the limitations of both dependent claims 36 and 37 but written in "means for" or "step for" language in each limitation (i.e. "step for" instruction trace to obtain a first representation, "step for" testvector sequence to obtain a second representation, "step for" comparing first and second representations, etc., for example. At such time the examiner would favorably consider the allowance of independent claim 1 and related dependent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

9. *The prior art made of record and not relied upon is considered pertinent to applicant's disclosure, careful consideration should be given prior to applicant's response to this Office Action.*

U.S. Patent 6,483,327 issued to Bruce et al teaches time-resolved detection of photoemissions in integrated circuit testing.

U.S. Patent 5,528,156 issued to Ueda et al teaches IC analysis by photoemission detection.

"Failure Analysis of ULSI circuits Using Photon Emission", Y. Uraoka, IEEE Log Number 9211664, IEEE 1993 – teaches IC analysis by photoemission detection.

"The Attack of the "Holey Shmoos": A Case Study of Advanced DFD and Picosecond Imaging Circuit Analysis (PICA)", W. Huott, ITC International Test Conference, IEEE, January 1999 – teaches IC analysis by PICA.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred Ferris whose telephone number is 703-305-9670 and whose normal working hours are 8:30am to 5:00pm Monday to Friday.

Any inquiry of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is 703-305-3900.

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